



Technologies for Net Zero Emissions

Dr. Nils A. Rökke
President EERA

19 October 2023, GSEU Day, Brussels, BE



EERA: The largest energy research community in Europe

Mission

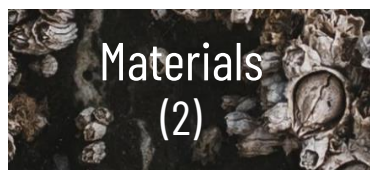
Catalyzing European energy research to achieve a **climate neutral society by 2050**

EU's privileged energy research authority

Vision

EERA Joint P

EERA coordinates activities among
18 Joint Programmes spanning the
EERA is the formal research pillar of



Researching energy pathways to a resilient and net-zero society

📅 17 October 2023 | 9.00 - 13.00 CEST

📍 TownHall Europe, Brussels & Online

8:30 AM

Welcome coffee and registration

9:00 AM

Welcoming remarks

Nils Røkke - President, EERA

9:10 AM

Keynote speeches

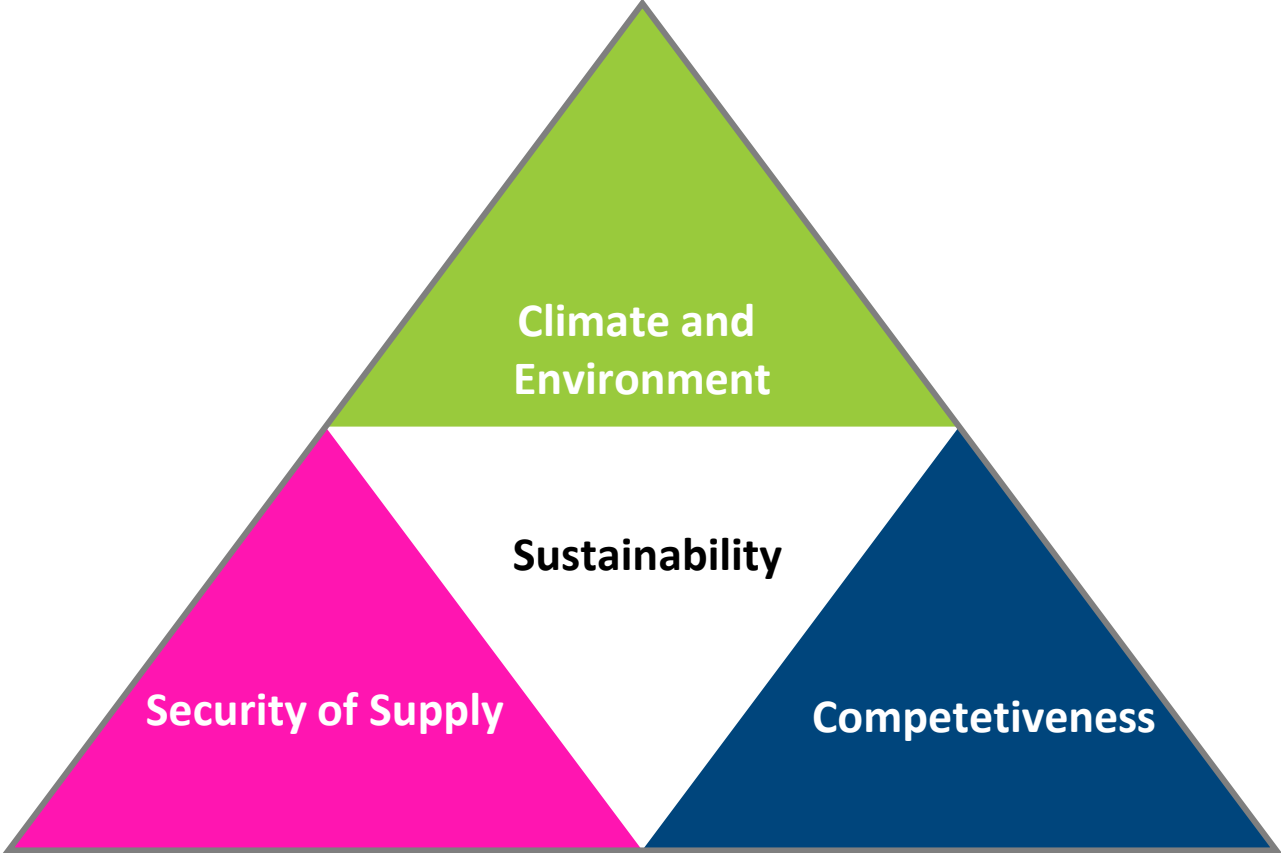
- *Salla Saastamoinen* - Deputy Director-General, JRC, European Commission
- *Sandrine Dixson-Declève* - Co-President, Club of Rome
- *Philippe Lamberts* - Member of the European Parliament, Co-President of the Greens/EFA
- *Paula Pinho* - Director Just Transition, Consumers, Energy Security, Efficiency and Innovation, DG ENER, European Commission

9:50 AM

EERA Energy Demand Reduction Report and Critical Raw Materials Analysis

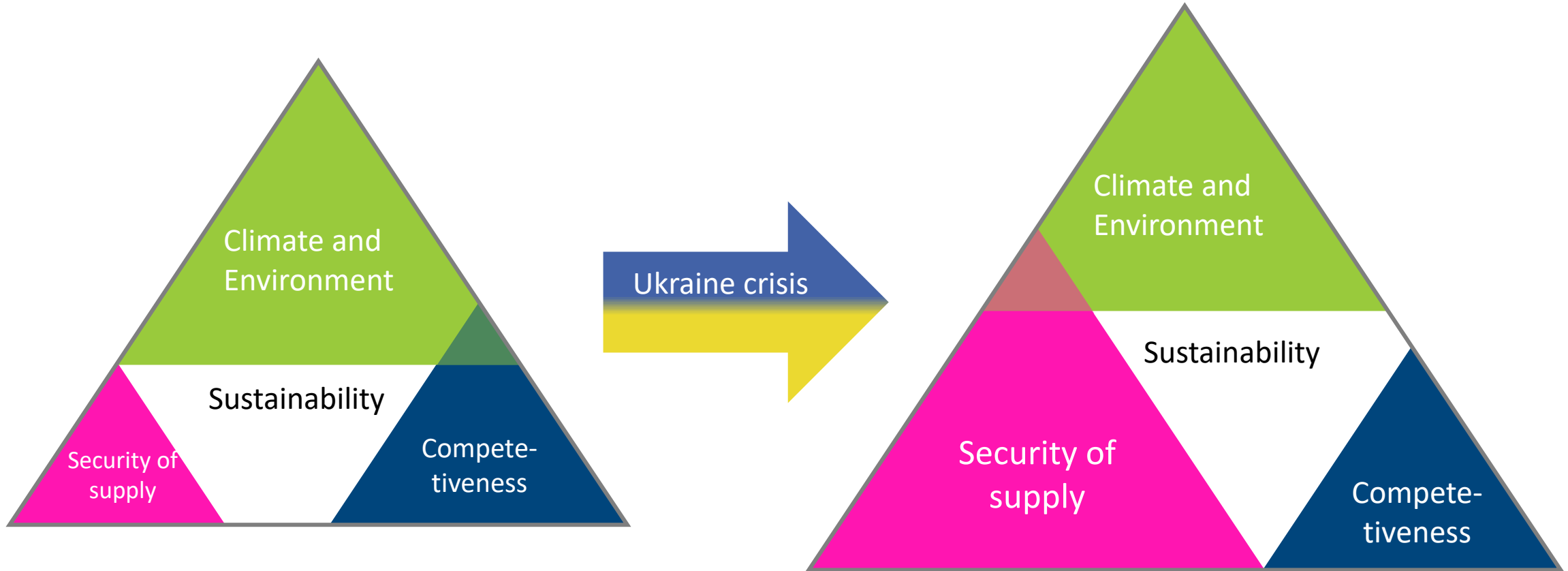
Adel El Gammal - Secretary General, EERA

The Energy Trilemma



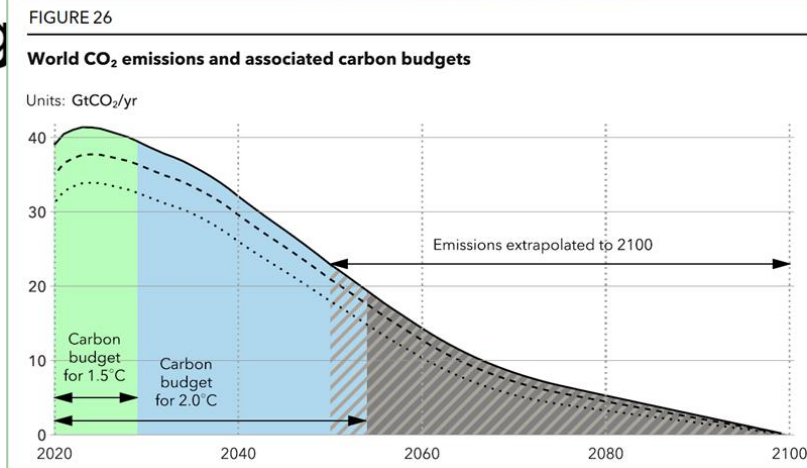
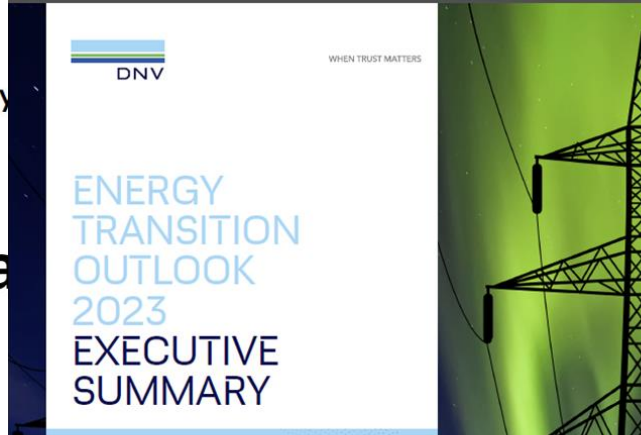
War in Europe

Change in priorities



The path to limiting global warming to 1.5 °C has narrowed, but clean energy growth is keeping it open

News
26 September 2023



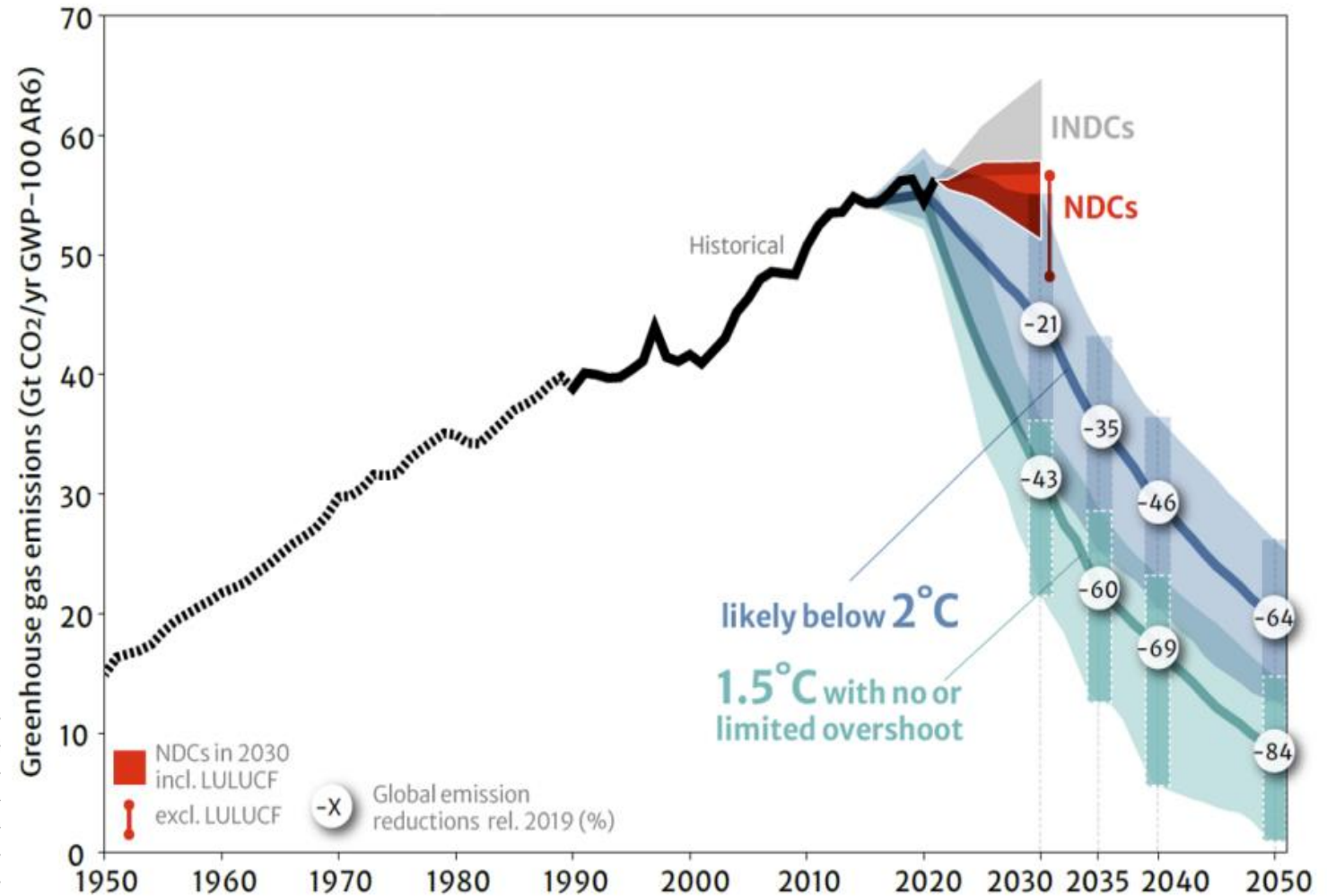
'Humanity has opened the gates to hell' warns Guterres as climate coalition demands action



© UN News/Acton Openamy | Leaders of states, business and civil society gathered in New York for the Climate Ambition Summit hosted by the UN Secretary-General.

Historical emissions from 1950, projected emissions in 2030 based on nationally determined contributions, and emission reductions required by the Sixth Assessment Report of the Intergovernmental Panel on Climate Change

UNFCCC Global Stocktake report 2023 - significant gaps

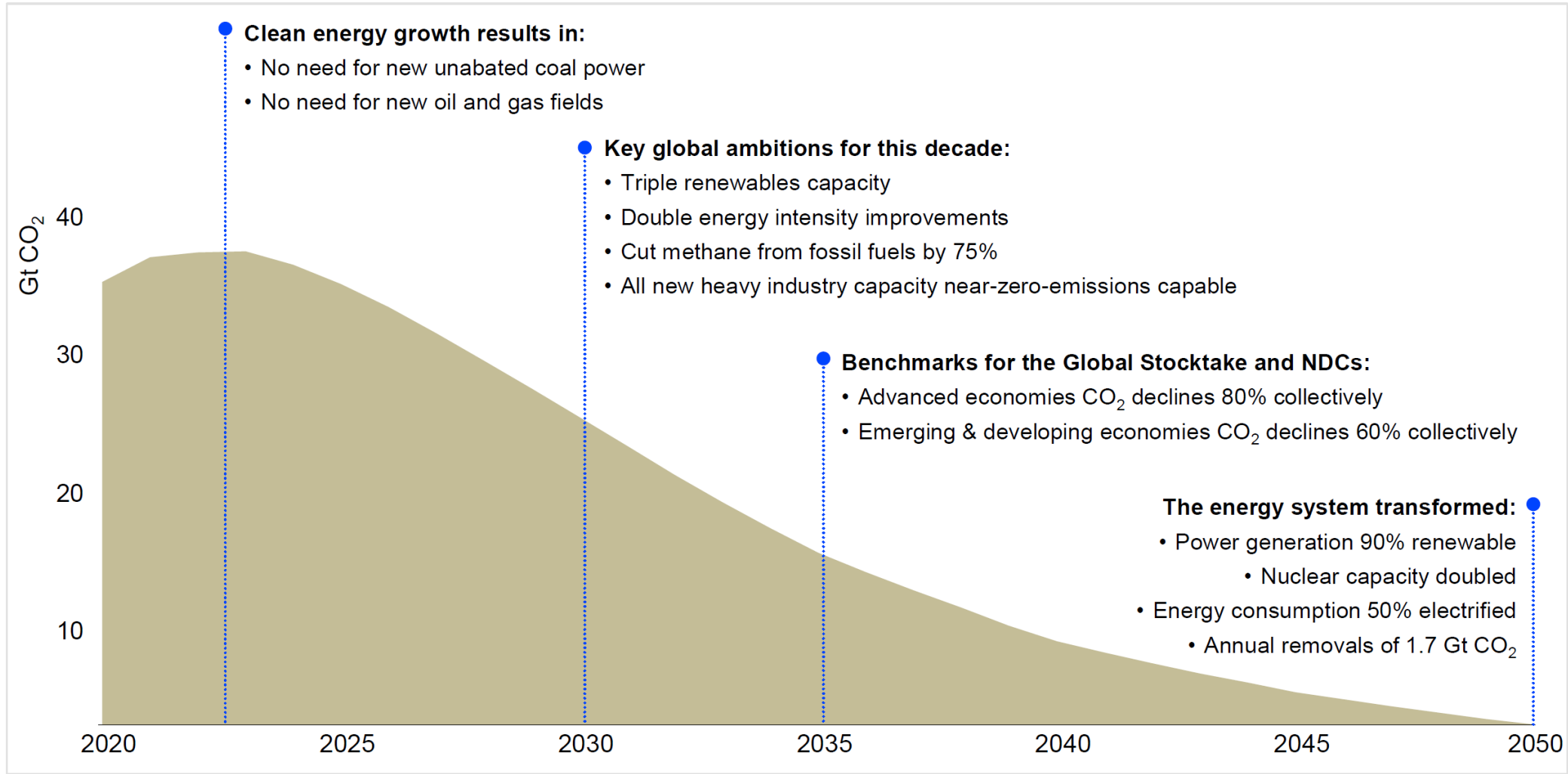


	Reductions from 2019 emission levels (%)				
	2030	2035	2040	2050	
Limit warming to 1.5°C (>50%) with no or limited overshoot	GHG	43 [34-60]	60 [49-77]	69 [58-90]	84 [73-98]
	CO ₂	48 [36-69]	65 [50-96]	80 [61-109]	99 [79-119]
Limit warming to 2°C (>67%)	GHG	21 [1-42]	35 [22-55]	46 [34-63]	64 [53-77]
	CO ₂	22 [1-44]	37 [21-59]	51 [36-70]	73 [55-90]

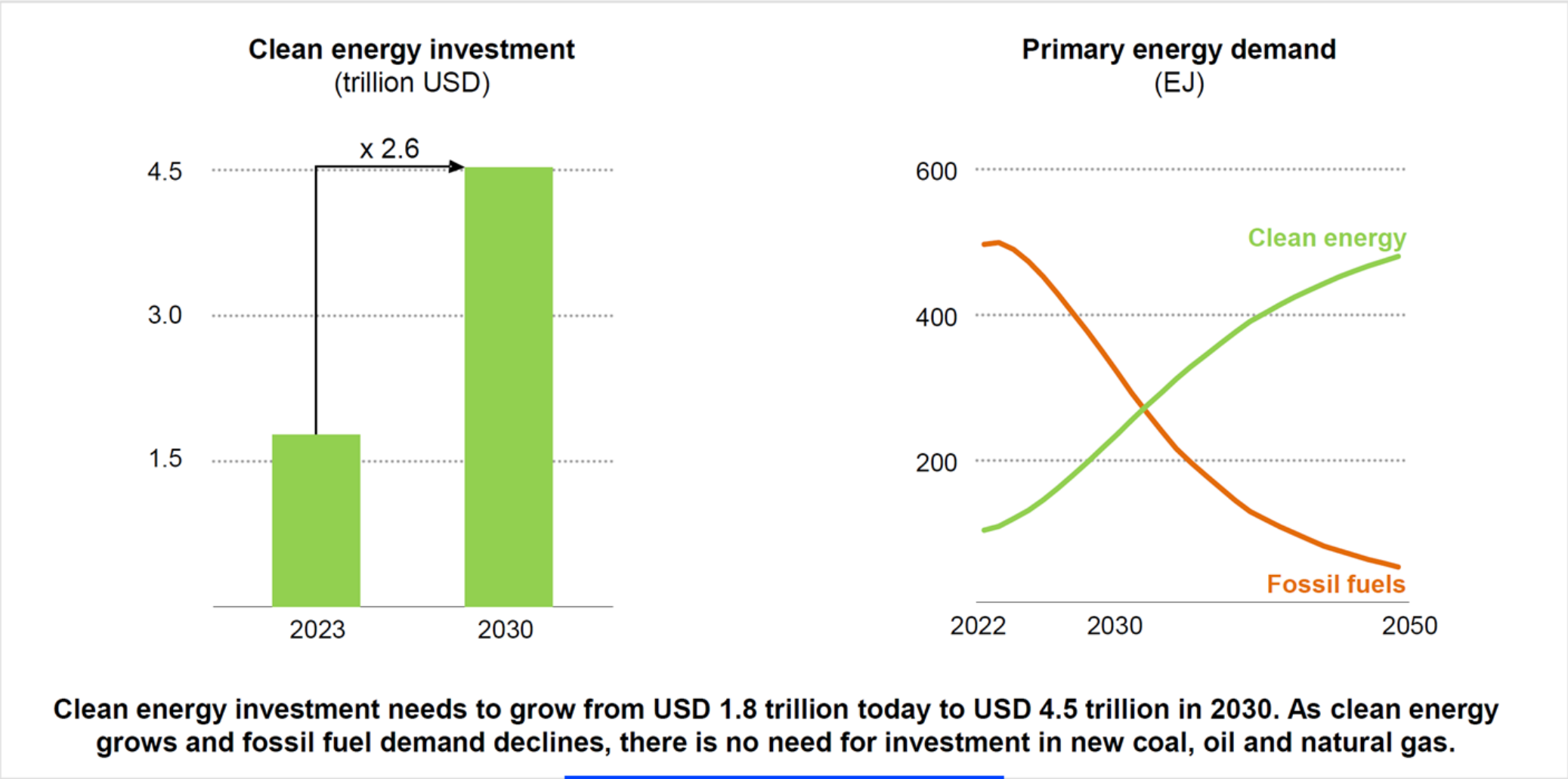


is possible

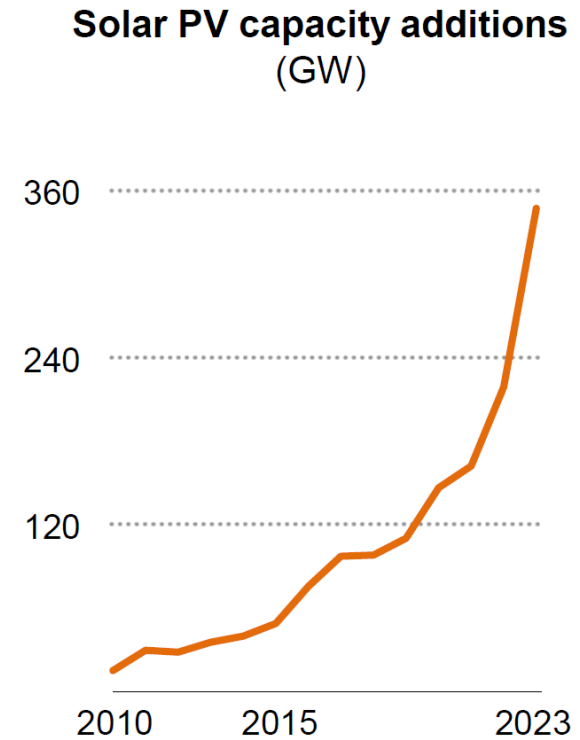
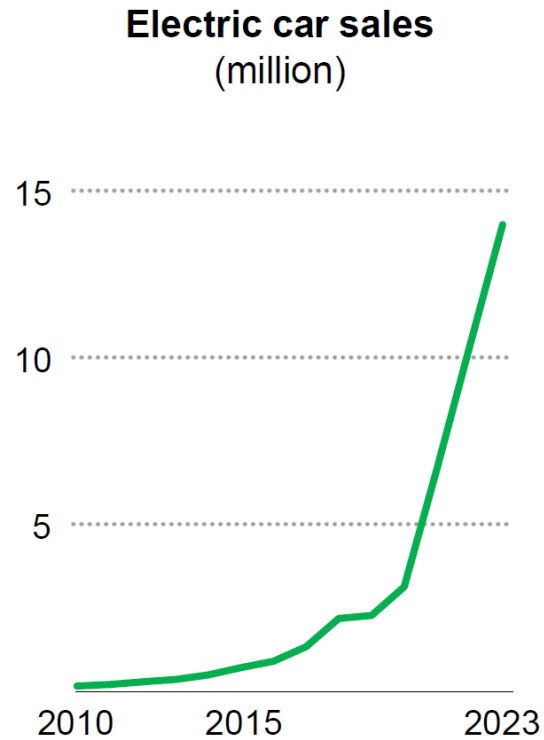
A roadmap to net zero by 2050



Strong growth in clean energy drives a decline in fossil fuel demand



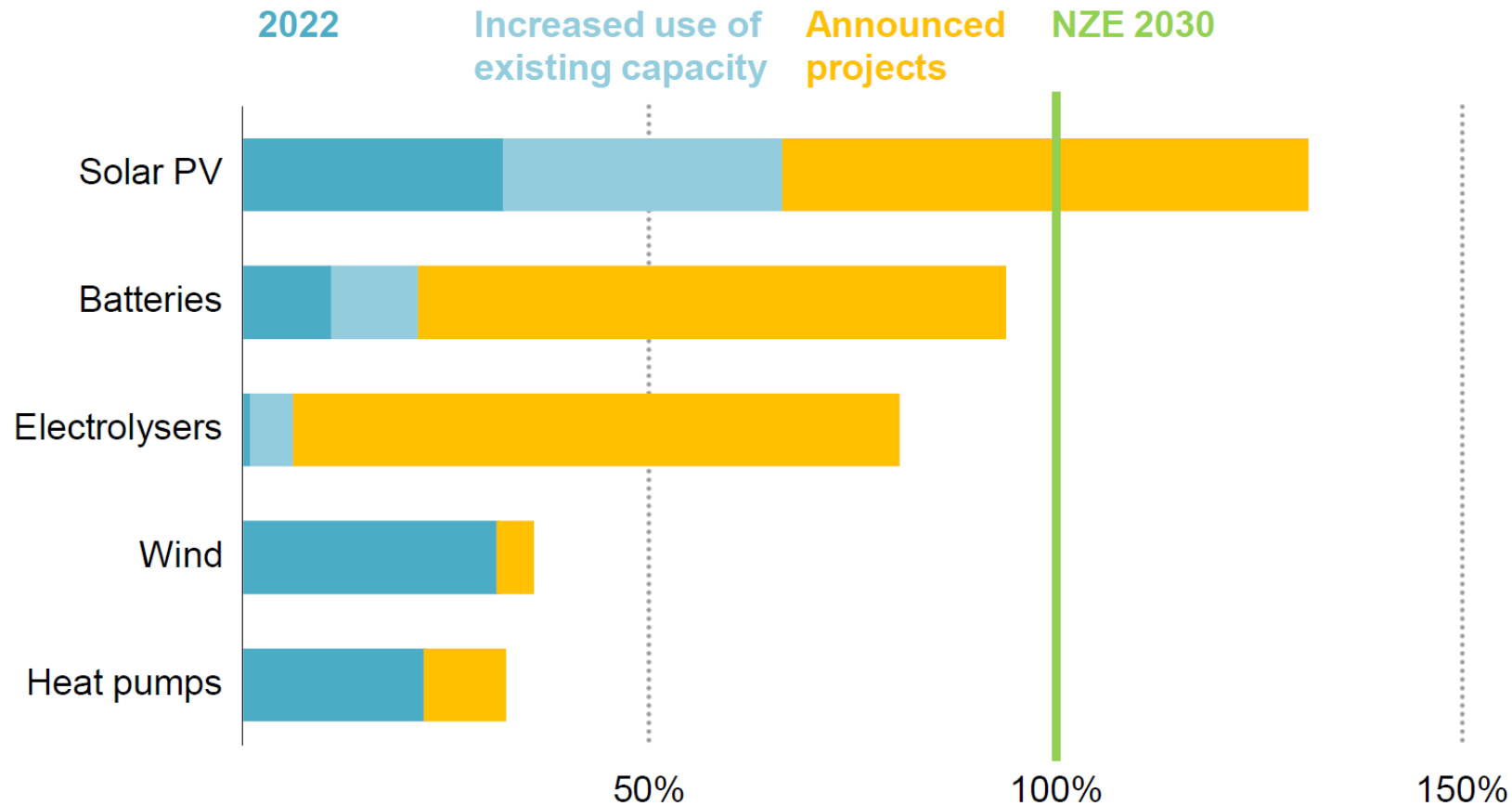
The path to 1.5 °C has narrowed, but clean energy growth is keeping it open



Global CO₂ emissions reached a record high in 2022, but the speed of the roll-out of key clean energy technologies means that coal, oil and natural gas will all peak this decade even without any new climate policies.

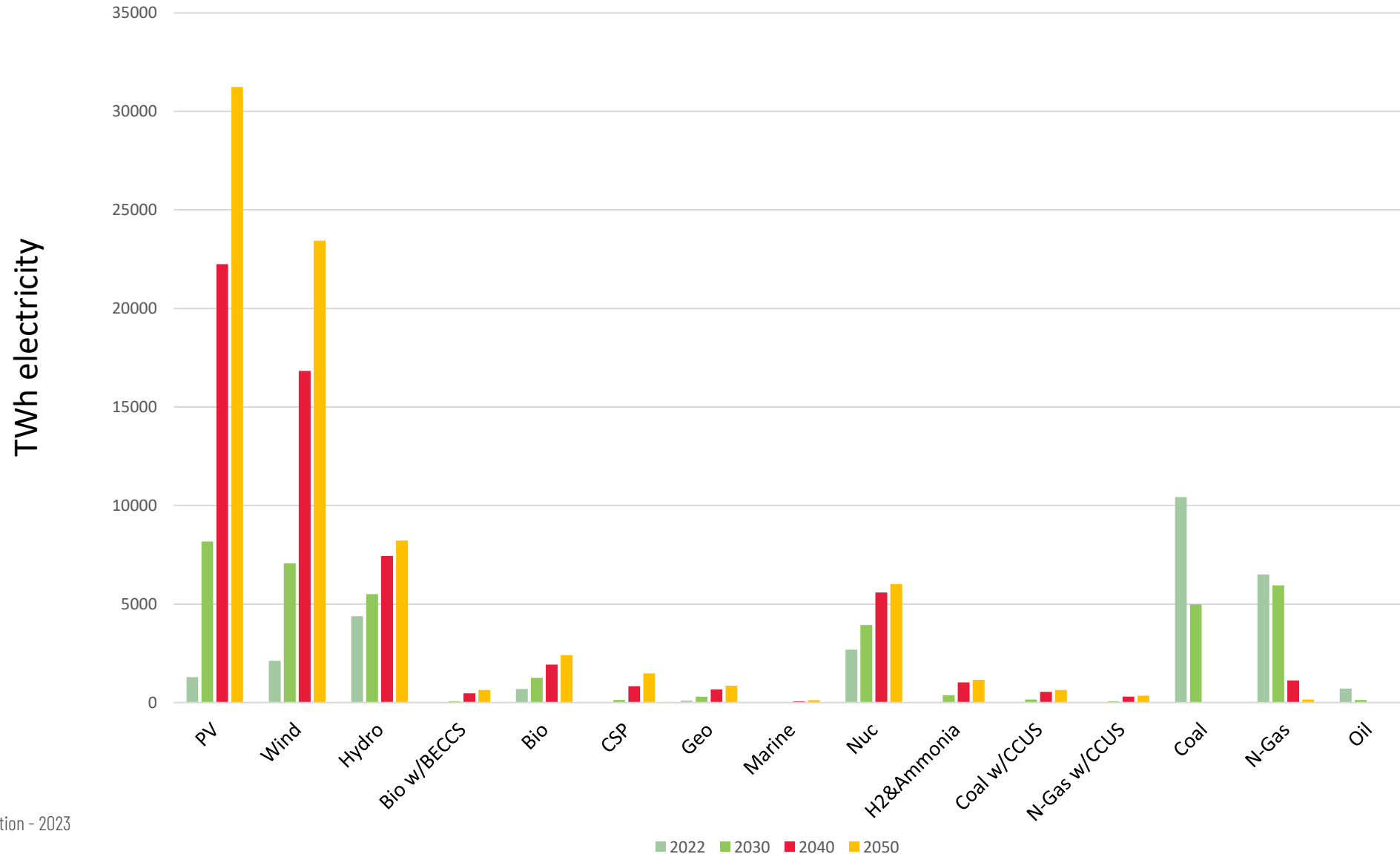
Clean technology supply chains present an industrial opportunity

Announced manufacturing project throughput and deployment of key technologies in the NZE Scenario

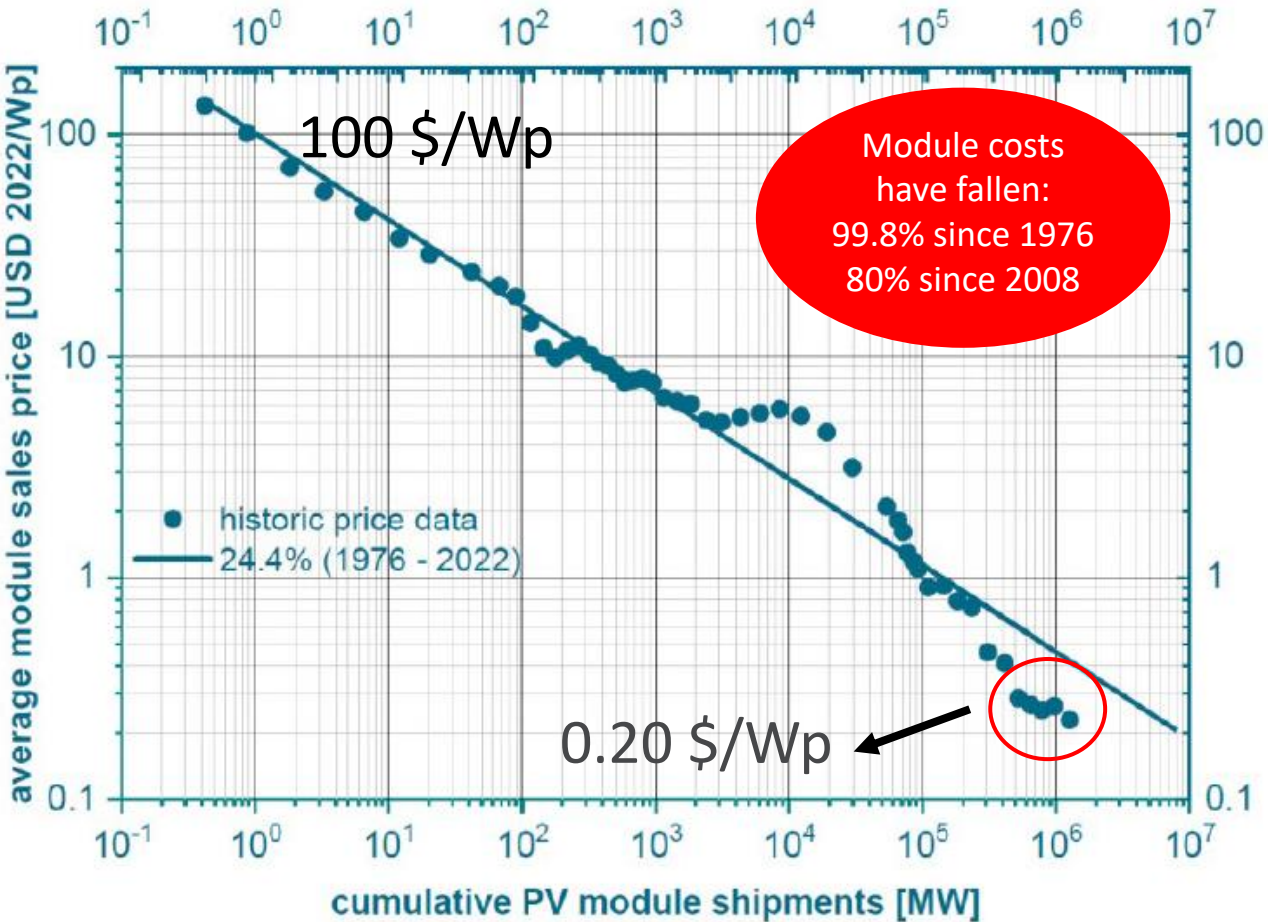


If all announced projects proceed, solar PV manufacturing will exceed the 2030 level needed in the NZE Scenario, and batteries manufacturing will get very close; other technologies see larger gaps.

World Electricity Sector - IEA Net Zero Emissions by 2050, Sept 2023

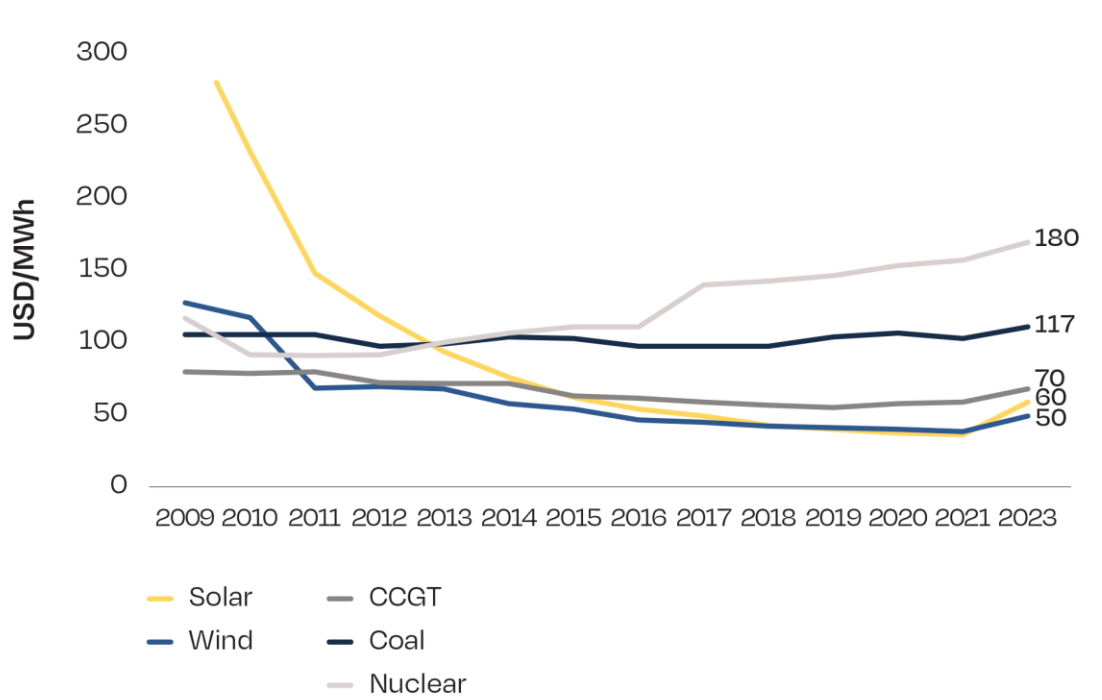


The cost of PV modules has decreased enormously the last decade making solar together with wind the cheapest energy source



ITRPV roadmap, 14th edition, 2023

SOLAR ELECTRICITY GENERATION COST IN COMPARISON WITH OTHER POWER SOURCES 2009-2023



SOURCE: Lazard (2023), Historical mean unsubsidised LCOE values (nominal terms, post-tax). © SOLARPOWER EUROPE 2023

Wind energy development

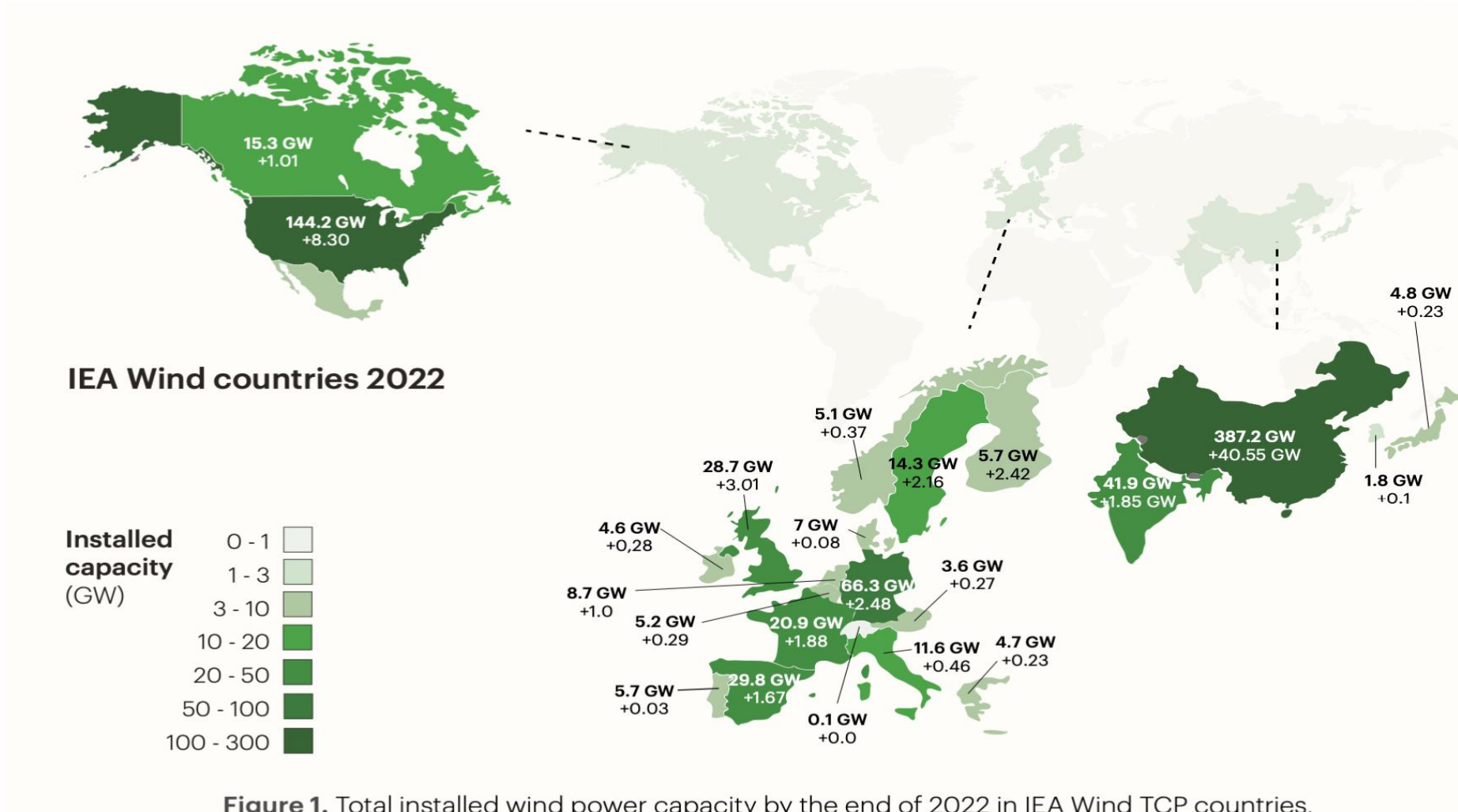


Figure 1. Total installed wind power capacity by the end of 2022 in IEA Wind TCP countries.

Wind energy evolution costs (onshore and offshore)

Figure 2.1 Global weighted average total installed costs, capacity factors and LCOE for onshore wind, 2010-2022

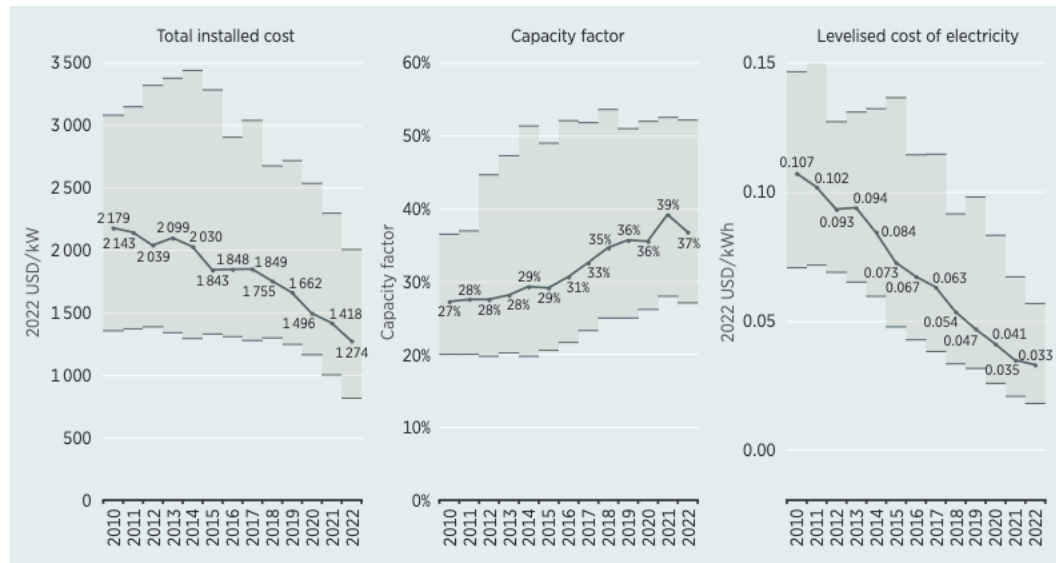
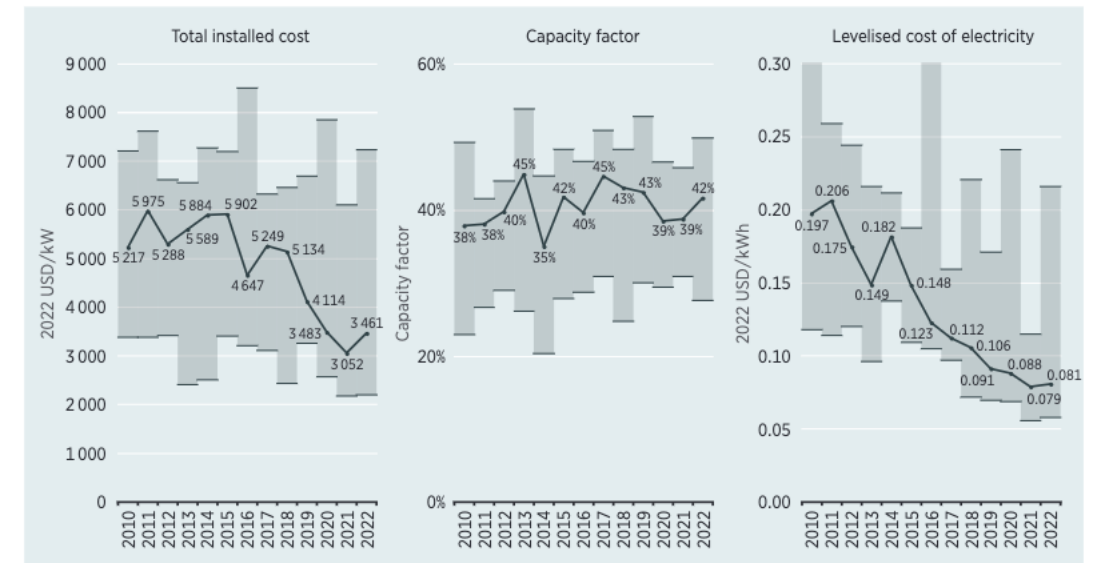


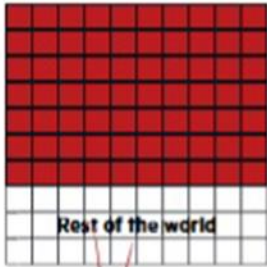
Figure 4.1 Global weighted average and range of total installed costs, capacity factors and LCOE for offshore wind, 2010-2022



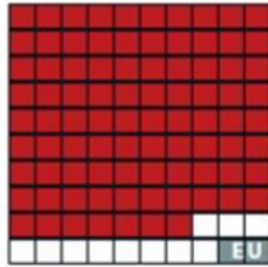
► Sources : *Report on Renewable Power Generation Costs in 2022*, IRENA, August 2023

China dominates global rare earths production

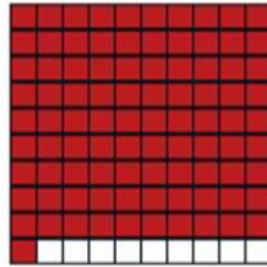
China mines 70% of rare earth concentrates...



... processes 87% ...



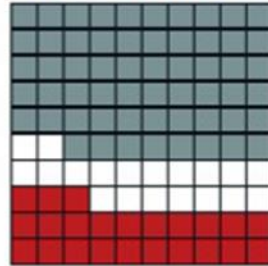
... and refines 91%



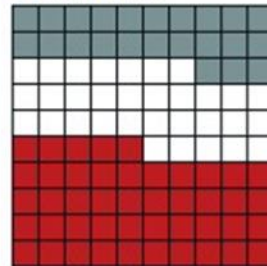
Rare earths used in magnets are made

Permanent magnets in wind turbines and EV motors

The European Union makes 58% of windmills ...



... and 23% of electric vehicles



Financial Times, 230923



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EU considers anti-subsidy probe into Chinese wind turbines

Competition commissioner says inquiry could follow similar move to challenge China's sales of electric vehicles in Europe



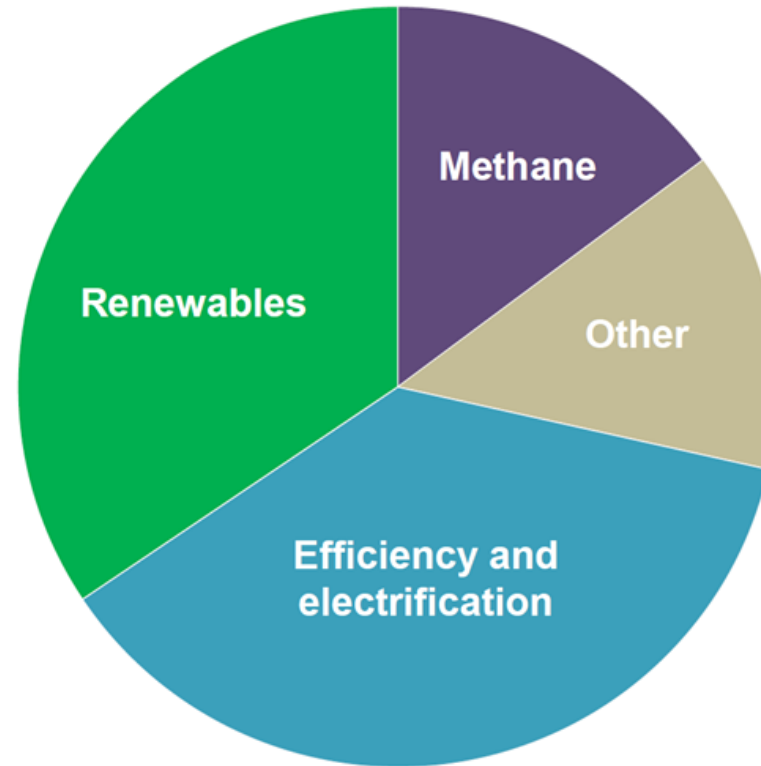
Europe's wind power companies have argued that cheap Chinese imports are pushing their own turbine manufacturers to the brink of collapse © Christian Charisius/AFP/Getty Images

Alice Hancock and Andy Bounds in Brussels OCTOBER 6 2023

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We have the tools to go much faster

Emissions reductions by measure by 2030 in the NZE Scenario

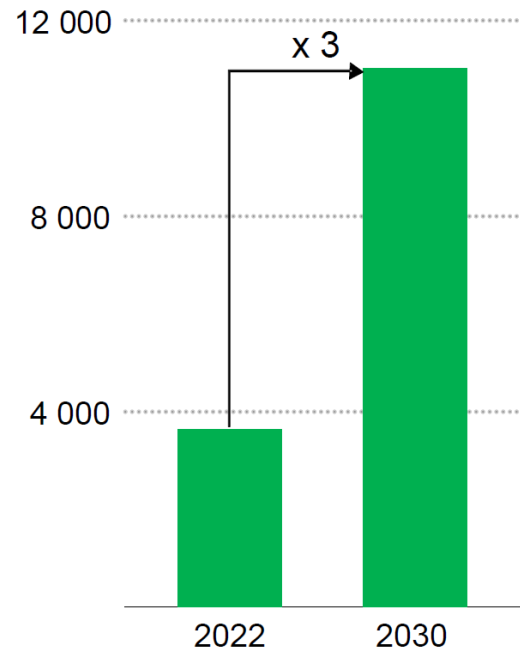


Energy-related greenhouse gas emissions peak by 2025 and decline by nearly 40% from today to 2030. Proven solutions available today deliver over 80% of what is needed this decade.

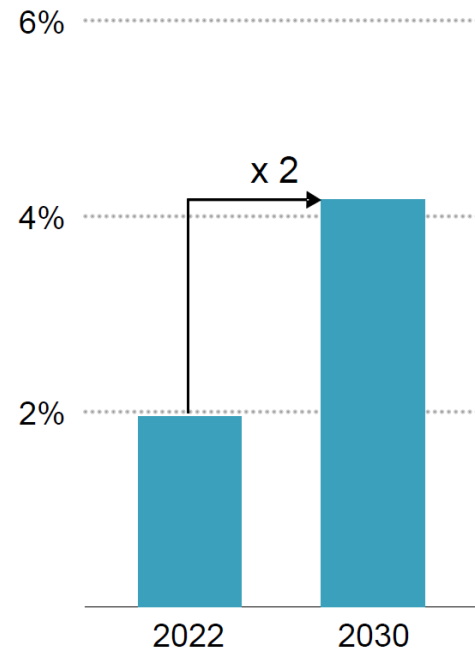
We have the tools to go much faster



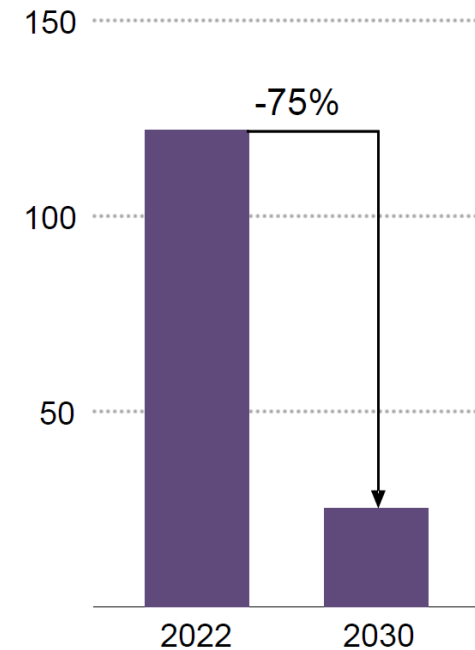
Renewables installed capacity (GW)



Annual energy intensity improvement



Methane emissions from fossil fuel operations (Mt)



Energy-related greenhouse gas emissions peak by 2025 and decline by nearly 40% from today to 2030. Proven solutions available today deliver over 80% of what is needed this decade.

But- can everything be solved by growth?

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BETA

FORBES > INNOVATION > SUSTAINABILITY

Rethinking Growth: Is Degrowth The Answer To A Sustainable Future?

Nils Rokke Contributor
I write about the global energy transition and net-zero emissions. [Follow](#)

Aug 21, 2023, 05:24am EDT



Is continuous growth compatible with our sustainable development goals?
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Energy Demand Reduction as part of the Clean Energy Transition in Europe:

Research and Policy Strategies



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Policy analysis

Securing sustainable critical raw material supply for clean energy in Europe

Context overview and role of research and innovation in solar PV, wind, hydrogen, batteries and power electronics



“We are
confronted with
the fierce
urgency of now...

**THIS IS A TIME
FOR VIGOROUS
AND POSITIVE
ACTION.”**

MARTIN LUTHER KING JR.
#MLKDAY





Thank you
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